

National Aeronautics and  
Space Administration



*Launch Services Program  
presents...*

## **Orbiting Carbon Observatory-2 (OCO-2)**

OCO-2 will be NASA's first Earth remote sensing satellite to study atmospheric carbon dioxide from Space. OCO-2 will be collecting space-based global measurements of atmospheric CO<sub>2</sub> with coverage needed to characterize sources and sinks on regional scales. OCO-2 will also be able to quantify CO<sub>2</sub> variability over the seasonal cycles year after year.

The world's oceans, plants and soils on land, and numerous other less significant carbon pools within the global carbon cycle steadily absorb carbon and are called sinks. They serve to reduce the amount of CO<sub>2</sub> that remains in the atmosphere. However, the geographic distributions of carbon uptakes by the oceans and terrestrial ecosystems are still uncertain. In addition, the effectiveness and efficiency of these sinks may change over time as more CO<sub>2</sub> is emitted into the atmosphere and, therefore, warrant study.

OCO-2 will be collecting a great number of high-resolution measurements, which will provide a greater spatial distribution of CO<sub>2</sub> over the entire globe. These measurements will be combined with data from the ground-based network to provide scientists with the information that they need to better understand the processes that regulate atmospheric CO<sub>2</sub> and its role in the carbon cycle. This enhanced understanding is essential for improving predictions of future atmospheric CO<sub>2</sub> increases and its impact on Earth's climate.

**Launch Vehicle**  
Delta II

**Launch Location**  
Vandenberg  
Air Force Base, CA

**Launch Date**  
2014

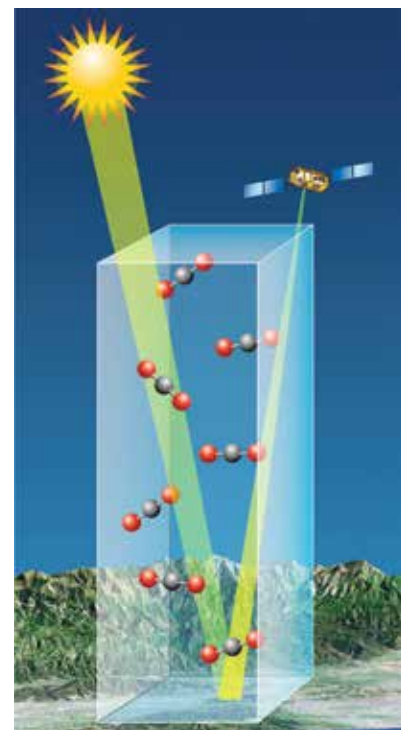


# Orbiting Carbon Observatory-2 (OCO-2)

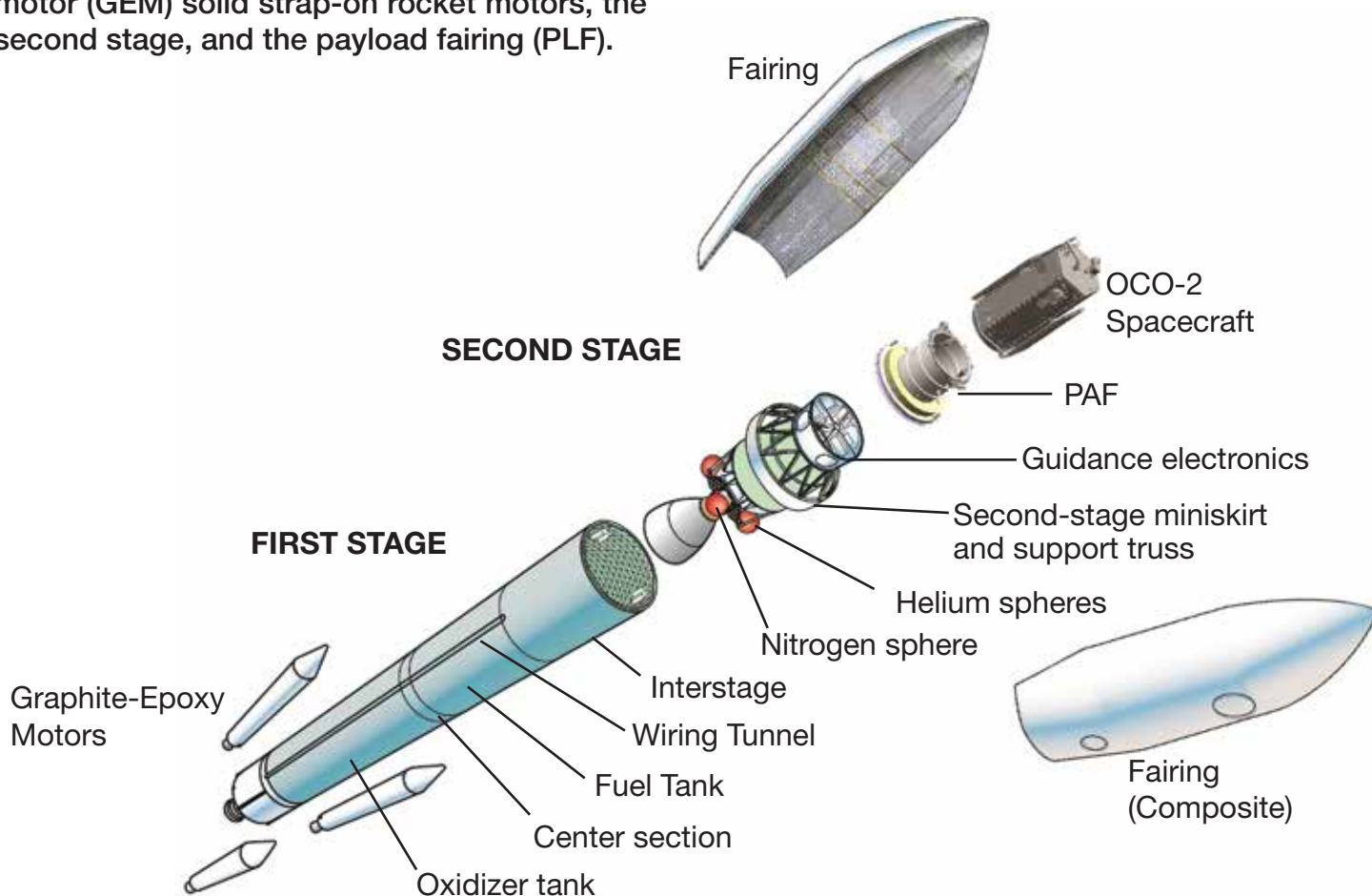
**OCO-2's** instrument will not be measuring CO<sub>2</sub> directly; but actually, the intensity of the sunlight reflected off the Earth's surface from the presence of CO<sub>2</sub> in a column of air. This measurement is unique like a fingerprint, and can be used for identification. The OCO-2 instrument will use a diffraction grating (like the back of a compact disk) to separate the incoming sunlight into a spectrum of multiple component colors.

Carbon dioxide and molecular oxygen molecules in the atmosphere absorb light energy at very specific colors or wavelengths. The instrument will measure the intensity of three relatively small wavelength bands (Weak CO<sub>2</sub>, Strong CO<sub>2</sub> and Oxygen O<sub>2</sub>) from the spectrum, each specific to one of the three grating spectrometers. The absorption levels will indicate the presence of the different gases. By simultaneously measuring the gases over the same location and over time, OCO-2 will be able to track the changes over the surface over time.

OCO-2 will be launched on a **Delta II** launch vehicle from Vandenberg Air Force Base. The major elements of the Delta II launch vehicle are the first stage with three graphite-epoxy motor (GEM) solid strap-on rocket motors, the second stage, and the payload fairing (PLF).



Artist rendition of the CO<sub>2</sub> column that OCO-2 will see  
Created by Debbi McLean/GSFC



Drawing Courtesy of: United Launch Alliance